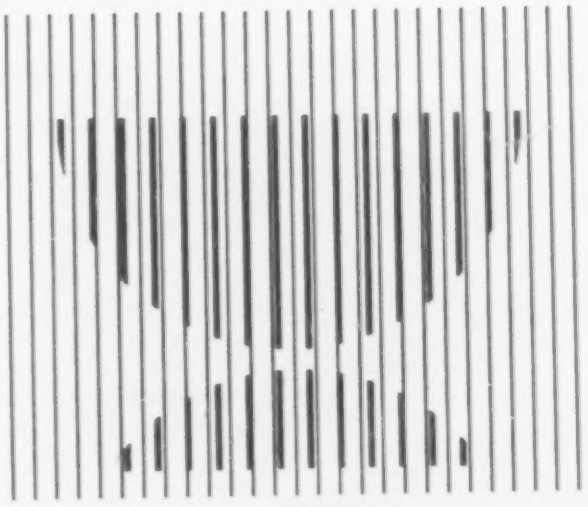
CBO STAFF MEMORANDUM

THE ECONOMIC EFFECTS OF UNCOMPENSATED CHANGES IN THE FUNDING OF SOCIAL SECURITY

April 1991



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This memorandum was prepared at the request of the Committee on Finance of the United States Senate. It examines the macroeconomic effects of reducing payroll taxes financed by an increase in government borrowing. In accordance with the Congressional Budget Office's mandate to provide objective and impartial analysis, the memorandum contains no recommendations.

Trevor Alleyne of CBO's Fiscal Analysis Division prepared the memorandum under the direction of Frederick Ribe and Robert Dennis. Robert Arnold, Joyce Manchester, and Warwick McKibbin carried out many of the simulations that are reported in the memorandum. Paul Cullinan, Maureen Griffin, and Paul Van de Water provided critical comments. L. Rae Roy, assisted by Dorothy Kornegay, prepared the paper for final release.

SUMMARY

The economic effects of moving toward pay-as-you-go funding of Social Security and away from the present system (which has some advance funding), would be negligible if the changes in the unified budget deficit that would be implied by this change in fiscal policy were offset by other fiscal measures.

If, however, there are no offsetting changes in other taxes or in government spending, then the change in the federal deficit that would result from pay-as-you-go funding of Social Security is likely to be reflected in a decline in national saving over the first 25 years (relative to what would occur if the current system was maintained), and an increase in national saving afterward.

CBO simulations--which assume no offsetting fiscal measures--with three economic models suggest that during the period of declining national saving, output would rise briefly and then fall, while interest rates, prices, and the exchange value of the dollar would all increase. In the period of rising national saving, output would rise, while interest rates, prices and the exchange value of the dollar would all fall.

INTRODUCTION

The Social Security system, which currently entails some advance funding, is building up substantial surpluses in the trust funds that will eventually be drawn down to pay

benefits when the number of retirees increases rapidly during the first few decades of the twenty-first century. Recently, several changes in this system have been proposed. Some proposals would fund the system on a pay-as-you-go basis--that is, by paying for benefits in a given period out of taxes and other revenues collected during approximately the same period. These proposals would involve lowering the Social Security payroll tax rate now, since the trust funds' income currently far exceeds benefit payments, and raising the tax rate later to meet higher future benefit payments. Some proposals would also raise the maximum earnings subject to taxation, in response to what some analysts perceive to be a lack of fairness in the current system and to reduce the revenue loss from the lower payroll tax rates. Still other proposals would reduce the trust fund surpluses by increasing benefits rather than by reducing tax collections--for example, by allowing people over the age of 65 to increase their earned income without losing Social Security benefits.[1]

This memorandum examines only the macroeconomic issues involved in changing to pay-as-you-go funding of Social Security. The change to a pay-as-you-go system, if it was not offset by other fiscal changes, would raise a number of important issues not examined here: issues of equity between generations, since currently working generations would gain at the expense of later generations; issues that concern the sensitivity of the system's funding to economic fluctuations because there would be a smaller buffer between the system's income and its outgo; and

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1. For a description of these proposals, see D. Koitz and G. Kollmann, "Social Security: Surplus Receipts Trigger New Financing Debate," CRS Issue Brief (Congressional Research Service, March 5, 1991).

issues of equity among classes of current taxpayers, since Social Security taxes are more regressive than most other major federal taxes.

Although this study examines the macroeconomic effects of a change in Social Security funding, the most important channel through which these changes in funding would affect the economy is the unified budget deficit. The macroeconomic effects described in this study would not be significantly different from the macroeconomic effects of other fiscal policies that produced the same changes in the deficit as those produced by the alternative Social Security funding schemes. Put another way, if the changes in the deficit caused by changes in the funding of Social Security were offset by changes in other taxes or changes in government expenditures, then the overall macroeconomic effects would be slight.

The government's ability to finance a given schedule of Social Security benefits is more closely related to the future strength of the economy than to the solvency of the Social Security trust funds. This is because the assets of the Social Security trust funds do not represent any real stock of resources set aside to pay for benefits in the future. Benefits due in a given year must be financed either by government revenues collected in that year or by borrowing. The only way to make either measure easier is to take steps to increase the future size of the economy as much as possible. Increasing the assets of the Social Security trust funds now will improve the government's ability to pay for benefits in the future by raising government saving and, with it, national saving. This higher level of government saving, assuming it is not completely offset by lower private saving, increases the

potential for economic growth that will raise the future tax base and future tax revenues. Also, higher government saving now implies a lower stock of government debt in the future, and hence lower interest payments. These two factors would put the government in a better position to pay for a given schedule of future benefits out of its own future revenues.

Clearly, higher levels of saving, which improve the government's ability to finance given future benefit payments out of its own revenues, can be obtained whether the Social Security trust funds are currently accumulating assets, drawing down assets, or even if the funds are abolished. Regardless of the status of the Social Security trust funds, other taxes can be raised and government spending can be reduced in order to increase national saving through reductions in the federal deficit.

Nonetheless, changes in the funding of Social Security, if enacted in isolation (that is, without changes in other taxes or in government expenditures), could have a substantial effect on national saving. The system currently accounts for about 10 percent of total gross national saving, and that ratio will rise over the next 20 years if, as expected, the trust funds' income grows faster than outgo. Pay-as-you-go, in the absence of offsetting changes in fiscal policy, would mean a sharp reduction in gross national saving during the next 20 years or so, followed by an even larger increase afterward.

The Focus of This Study

The Congressional Budget Office compared the current funding system for Social Security with two pay-as-you-go alternatives. The first alternative would require the trust funds to maintain assets equal to 100 percent of annual expenditures; the other alternative would require the funds to maintain assets equal to 150 percent of annual expenditures.[2] Both cases assume no changes in other taxes or in government expenditures. Figure 1 shows the ratio of trust fund assets to trust fund expenditures under the current system and under the two alternatives. A rising ratio of assets to expenditures implies that trust fund income (trust fund collections plus interest income) is growing faster than expenditures (benefits plus administrative expenses); a declining ratio implies the opposite (with fund assets being drawn down to make up the shortfall); and a flat ratio implies that trust fund income is growing at the same rate as expenditures.

The quantitative results described in this memorandum should be interpreted with caution for two reasons. First, this study necessarily compares a pay-as-you-go system with the current system on the assumptions that the current system will not be changed over the next several decades and that other aspects of fiscal policy will not be changed. But these assumptions are highly implausible: Figure 1 shows that the current financing arrangements, if unchanged, would exhaust the trust funds in

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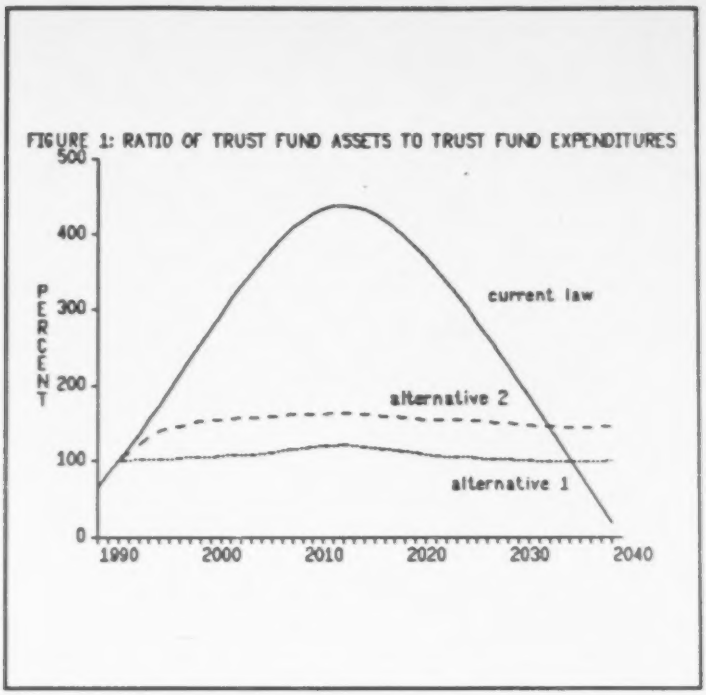
2. The requirement to maintain trust fund reserves addresses a concern expressed by many analysts. These analysts argue that the Social Security system needs to have a reserve to act as a buffer against unforeseen downturns in economic activity (which would cause tax collections to be lower than anticipated) and to maintain general public confidence in the Social Security system.



the first half of the next century. Before that time, the Social Security system is virtually certain to undergo changes. Steps could be taken to maintain the current approach of partial advance funding, or the trust funds could be moved toward a pay-as-you-go system. For this reason, the current system does not represent an entirely appropriate baseline scenario against which to compare alternative funding schemes.

Second, the results from the simulations of the three economic models (described in a later section) may understate the effects on the economy of changing Social Security funding because of a characteristic of the models examined. In all

of the models, growth in total factor productivity is assumed to be constant.[3] But comparisons of saving, investment, and productivity among countries suggest a correlation between growth in total factor productivity and the rate of saving and investment.[4] Some analysts interpret this correlation in the data to mean that changes in the rate of saving and investment *cause* changes in the growth of total factor productivity, and would thus argue that the impacts on real gross national product (GNP) described in this memorandum ought to be increased, probably by around 50 percent. However, recent studies have argued for a different interpretation of the data that would not lead to any change in the impacts on real GNP described by the models.[5]

MACROECONOMIC EFFECTS

The macroeconomic effects of moving toward pay-as-you-go funding of Social Security and away from the present system (without compensating changes in other parts of the federal budget) are best illustrated by examining two distinct time periods: the period of lower tax rates and reduced national saving (1992 to about 2016) and the period of higher tax rates and increased national saving (about 2017

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3. Total factor productivity describes the productivity of all factors of production together, rather than just labor, and its growth is usually attributed to changes in education and to technological progress.

4. The evidence was examined in Congressional Budget Office, *The Economic and Budget Outlook: Fiscal Years 1990-1994* (January 1989), Chapter III.

5. See, for instance, J. Benhabib and B. Jovanovic, "Externalities and Growth Accounting," *American Economic Review*, vol. 81, no. 1 (March 1991), pp. 82-113.

and beyond). The shift toward pay-as-you-go funding that CBO analyzes in the next section of this memorandum involves cuts of one to two percentage points in the combined employers' and employees' payroll tax. As Table 1 shows, a continuation of current policy would hold the combined tax rate at an average level of roughly 12.4 percent over the next several decades. By contrast, the pay-as-you-go approach would initially involve a cut in the combined rate to a level of about 10.5 percent followed by a steady increase to a level of 16 percent or more.

During the first period in the simulation, the changes in Social Security increase the federal deficit, thereby using up more of the private sector's saving and leading to a reduced rate of overall or national saving. Reduced national saving leads to a reduction in the growth of potential output. This reduction is masked in the first few years because lower saving and higher consumption lead to more intensive use of existing but underused productive capacity. Eventually, however, lower national saving reduces the growth rate of the capital stock used in producing output, and GNP becomes lower than it would otherwise be. The higher consumption persists, however, and this fact, along with the reduction in potential output, increases interest rates, prices, and the exchange value of the dollar. In the second period, when national saving is higher than it would otherwise be, all of these effects are reversed: potential output eventually rises, and interest rates, prices, and the exchange rate are all lower than they would otherwise have been.

These changes are unlikely to have significant long-lasting effects on employment, so in the long run changes in productivity would largely mirror changes

in GNP. However, during the first few years of the lower tax rates--when utilization of capacity temporarily increases--employment is likely to rise a little. Thus, growth in labor productivity is likely to be reduced during this period, even before there are significant negative effects on real GNP.[6]

The Period of Reduced National Saving (1992-2016)

Effects on GNP. The most important effect of the reduction in Social Security tax rates during the period of reduced national saving is the reduction in the growth of GNP. The reduction comes about because the bigger federal deficit uses up more of the available supply of saving, forcing interest rates upward and reducing productive investment. The decline in investment eventually reduces the growth of GNP by making less machinery, factories, infrastructure, and other productive capital available.

These effects could be muted if households increase their own saving when the government deficit increases, but probably only to a limited extent. Some economists have pointed out that if people foresee the higher taxes that will eventually be necessary to offset the increase in the deficit that results from a cut in Social Security taxes, they will increase their own saving to cushion the effects of the taxes. Were they to do this, national saving would fall less when the deficit

6. The models that CBO used in this analysis do not have explicit representations of employment. Quantitative discussions of the effects on employment are therefore difficult.

increases, and the growth of GNP would also slow down by less. The models that CBO has used suggest, however, that this offsetting effect will be slight in practice.

The decline in the growth of GNP may not be apparent during the first years after the policy change. This is because higher consumption is likely to increase aggregate demand and cause the economy to grow faster following the current recession by helping put idle workers and factories back to work. The reduction in Social Security taxes ought to lead to higher consumption by increasing disposable incomes. The lower payroll tax rates themselves leave more after-tax income for wage earners. In addition, the reduction in the employer's share of the payroll tax should lead to lower prices, which also increase real disposable incomes. Finally, as the discussion below points out, the tax cut should lead to a rise in the value of the dollar, reducing the prices of imported goods and further increasing real disposable incomes.

After a few years, however, no more idle productive capacity will be available, and the effects of the cut in Social Security taxes in slowing the growth of GNP will be evident. For the remainder of the period of lower saving, real GNP is likely to be lower than it would have been had Social Security taxes not been reduced.

Effects on the Exchange Rate and the Balance of Trade. The cut in payroll taxes during the first years after a change in Social Security financing policy will affect United States foreign trade as well. Because there is less national saving, the United

States spends more of its national income and the trade deficit increases. This increase in the trade deficit is helped along by a rise, or appreciation, in the value of the dollar on foreign exchange markets. The increase in interest rates that results from the cut in tax rates makes financial investments in this country more attractive, drawing more investment funds into the country and forcing the exchange value of the dollar higher.

Effects on the Price Level. Prices are affected in two different ways, but they should eventually rise as a result of changes in Social Security. The increase in prices results from both an increase in aggregate demand and a reduction in the economy's capacity to supply output to meet this demand. Both factors contribute to upward pressures on wages and prices--pressures that are likely to lead to permanent increases in prices.

During the first few months or years after the tax cut, however, the increase in prices is likely to be offset by two factors leading to a temporary decline in prices rather than an increase: the appreciation of the dollar, and the reduction in the employer's share of the Social Security tax. The appreciation of the exchange value of the dollar, mentioned above, reduces the prices of imported goods and domestic goods that compete with imports. In addition, during the first months or years after the cut in Social Security taxes, prices are likely to fall because the reduction in the employer's share of the Social Security tax reduces their costs and reduces pressures on prices from this source. While some of the reduction in employer costs is likely

to give rise to higher wages, part of it should also be passed on to consumers in the form of lower prices.

The Period of Increased National Saving (2017 and Beyond)

During the period when payroll tax rates are higher than under current law, the effects described in the previous section are reversed, as government saving and national saving increase. The government's increased ability to finance expenditures out of its own funds reduces the overall demand for loanable funds, which in turn reduces interest rates. Investment increases, and this increases the growth of potential output. Eventually, as the capital stock rises above its baseline value, potential and actual output rise above levels that would be attainable with the current Social Security funding system. (As stated earlier, the baseline for this analysis assumes that no fiscal policy changes--in Social Security or elsewhere--are made over the next several decades. But since the funding of the system will apparently have to be changed by then in order to avoid exhausting the assets of the trust funds, it is not clear that shifting to a pay-as-you-go system now would improve national income prospects in the next century.)

As compared with current law, pay-as-you-go funding reduces interest rates in this second period and thus reduces the relative demand for dollar-denominated securities. The result is a fall in the exchange value of the dollar. This drop has a positive effect on net exports by increasing the price competitiveness of U.S. exports

in foreign markets and reducing the price competitiveness of foreign goods in domestic markets. Net exports are further boosted by an overall decline in consumer expenditures (on domestic as well as foreign goods), the result of a decline in disposable incomes caused by the higher payroll taxes.

GNP eventually rises as the increases in net exports and investment outweigh the decline in consumption. All of this increase in GNP is likely to be reflected in higher labor productivity, with little or no long-run impact on levels of employment. Domestic prices fall as potential output rises relative to aggregate demand, putting downward pressure on domestic prices despite the influence of higher prices of imported goods.

Throughout this analysis, monetary policy has been assumed to be unchanged. The Federal Reserve's response to the changes in fiscal policy implied by these changes in Social Security taxes could significantly alter the analysis presented above. Fiscal policy would be expansionary over the first 20 or so years, and contractionary afterward; the Federal Reserve might choose either to accommodate or to try to offset the changes, depending on economic conditions at a particular time.

Quantitative Estimates of the Effects of Two Alternative Social Security Funding Schemes

Both of the alternative Social Security funding schemes that CBO has examined are modified pay-as-you-go schemes. As such, they differ from the system now in place, which entails a degree of advance funding. Also, the overall impacts of the two alternatives on national saving and wealth would be similar. The first alternative (ALT1) requires the Social Security trust funds to maintain assets equal to 100 percent of annual expenditures; the second alternative (ALT2) requires the trust funds to maintain assets equal to 150 percent of annual expenditures. Table 1 summarizes the changes in Social Security trust fund collections that are implied by these two schemes, as well as the assumptions for payroll tax rates, economic growth, and inflation from which these changes are derived.[7]

CBO used three models to analyze the effects of these alternative funding schemes. This first is a simple growth model (GROWTH) developed at CBO to examine these and similar questions.[8] CBO also used two more complex models: the McKibbin-Sachs Global model (MSG) and the INTERMOD model.[9] The

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7. All of these key assumptions coincide with the Social Security Administration's II-B assumptions, which contain predictions of moderate economic growth and inflation. See Social Security Administration, *The Federal Old-Age, Survivors and Disability Insurance Trustees Report, 1990* (1990).

8. See Congressional Budget Office, *The Economic and Budget Outlook: Fiscal Years 1990-1994 (January 1989)*.

9. The MSG model was developed by Warwick McKibbin of the Brookings Institution and Jeffrey Sachs of Harvard University. INTERMOD is a world model developed at the Canadian Department of Finance. For the specification and properties of these models see Warwick McKibbin and Jeffrey Sachs, "The McKibbin-Sachs Global Model," Brookings Discussion Paper in International Economics No. 78 (Washington, D.C.: Brookings Institution, 1989); and Guy Meredith, "INTERMOD 2.0: Model Specification and Simulation Properties," Working Paper

TABLE 1. BASELINE ECONOMIC ASSUMPTIONS AND ALTERNATIVE SOCIAL SECURITY TRUST FUND COLLECTIONS USED IN CBO SIMULATIONS (Annual averages)

	1992-1996	1997-2006	2007-2016	2017-2026	2027-2036	2037-2046
			Baseline			
Real GNP Growth Rate (Percent)	2.3	2.1	1.8	1.8	1.8	1.8
GNP Deflator Growth Rate (Percent)	4.1	4.1	3.9	3.6	3.7	3.7
Nominal GNP (In billions of dollars)	7,163	11,411	20,286	34,686	59,098	101,411
Social Security Tax Rate (Percent)	12.4	12.4	12.4	12.4	12.4	12.4
Social Security Trust Fund Collections (In billions of dollars)	374	587	1,031	1,729	2,889	4,865
			ALT1			
Social Security Tax Rate (Percent)	10.5	10.5	11.5	13.9	15.8	16.3
Change in Social Security Trust Fund Collections (ALT1 minus baseline in billions of dollars)	-59	-90	-71	225	793	1,554
			ALT2			
Social Security Tax Rate (Percent)	11.3	10.5	11.5	14.1	15.7	16.0
Change in Social Security Trust Fund Collections (ALT2 minus baseline in billions of dollars)	-34	-89	-69	251	774	1,422

SOURCE: Congressional Budget Office using data from Social Security Administration, *The Federal Old-Age, Survivors and Disability Insurance Trustees Report, 1990* (1990).

growth model has proved very useful because it captures the essential facts describing how government deficits affect economic activity in the medium and long term. The other two models differ from the growth model by allowing for the effects of forward-looking or model-consistent expectations and by taking into account economic activity outside the United States. Forward-looking expectations mean that the decisions economic agents make today reflect, to some extent, the agents' expectations of future events. Moreover, these expectations are consistent with the behavior of the economy as described by the economic model. Such forward-looking models are particularly appropriate for the analysis of alternative Social Security funding schemes, since these schemes involve a timetable of known future changes in payroll taxes that are likely to affect economic decisions made today. The fact that the models are world models implies that they also reflect the way in which changes in the U.S. economy interact with a world economy, in particular showing the effect on exchange rates.

Tables 2 and 3 show the effects of the two funding schemes on a few important macroeconomic variables according to these models. The effects on real GNP, consumption, and other variables are similar for both schemes, because once the targets for asset-expenditure ratios have been reached, the tax rates of the two pay-as-you-go alternatives are very similar (see Table 1). Because ALT1 involves a deeper initial tax cut than ALT2, interest rates, prices, and exchange rates rise slightly more in ALT1, and national saving and the capital stock fall more. However, both schemes have roughly the same effects after 50 years.

No. 89-7 (Ottawa: Department of Finance, 1989).

TABLE 2. **RESULTS OF SIMULATION ANALYSIS, USING THREE ECONOMIC MODELS, OF ALT1: MAINTENANCE OF TRUST FUND RESERVES EQUAL TO 100 PERCENT OF ANNUAL EXPENDITURES (In percentage difference from baseline, except where noted)**

	1992-1996	1997-2006	2007-2016	2017-2026	2027-2036	2037-2046
Real GNP						
MSG	0.0	-0.4	-0.6	-0.4	0.1	0.5
INTERMOD	0.2	-0.2	-0.3	N.A.	N.A.	N.A.
GROWTH	-0.4	-1.1	-1.0	-0.1	1.2	2.0
Consumption						
MSG	0.7	0.4	-0.1	-0.7	-0.7	-0.5
INTERMOD	0.5	0.1	0.0	N.A.	N.A.	N.A.
GROWTH	0.5	-0.3	-0.8	-0.8	0.1	0.9
Prices						
MSG	0.3	0.8	0.7	0.1	-0.6	-0.7
INTERMOD	0.1	0.5	0.6	N.A.	N.A.	N.A.
GROWTH	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Nominal Short-term Interest Rate[a]						
MSG	0.8	1.1	0.9	-0.1	-1.2	-1.2
INTERMOD	0.1	0.2	0.3	N.A.	N.A.	N.A.
GROWTH	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Real Short-term Interest Rate[a]						
MSG	0.7	1.0	0.9	0.0	-1.1	-1.2
INTERMOD	0.1	0.2	0.2	N.A.	N.A.	N.A.
GROWTH	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Nominal Long-term Interest Rate[a]						
MSG	1.0	1.0	0.5	-0.5	-1.0	-0.9
INTERMOD	0.2	0.2	0.3	N.A.	N.A.	N.A.
GROWTH	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Real Long-term Interest Rate[a]						
MSG	0.9	1.0	0.6	-0.3	-0.9	-0.9
INTERMOD	0.1	0.2	0.1	N.A.	N.A.	N.A.
GROWTH	0.2	0.5	0.4	-0.0	-0.4	-0.6
Real Exchange Rate						
MSG	2.1	1.5	-0.3	-2.5	-3.0	-2.1
INTERMOD	1.0	0.9	0.4	N.A.	N.A.	N.A.
GROWTH	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
National Saving Rate[a]						
MSG	-0.5	-0.7	-0.6	-0.1	0.5	0.8
INTERMOD	-0.1	-0.2	-0.2	N.A.	N.A.	N.A.
GROWTH	-0.8	-0.6	-0.2	0.6	0.9	0.8
Capital Stock						
MSG[b]	0	-.4	-.5	-.3	.2	.5
INTERMOD	0.0	-0.1	-0.1	N.A.	N.A.	N.A.
GROWTH	-3.4	-4.5	-3.6	0.5	5.5	8.0

NOTES: n.a. = not applicable; N.A. = not available.

a. The difference from baseline in percentage points.

b. Levels for the baseline capital stock were approximated by the Congressional Budget Office.

TABLE 3. RESULTS OF SIMULATION ANALYSIS, USING THREE ECONOMIC MODELS, OF ALT2: MAINTENANCE OF TRUST FUND RESERVES EQUAL TO 150 PERCENT OF ANNUAL EXPENDITURES (In percentage difference from baseline, except where noted)

	1992-1996	1997-2006	2007-2016	2017-2026	2027-2036	2037-2046
Real GNP						
MSG	0.1	-0.3	-0.6	-0.3	0.2	0.5
INTERMOD	0.2	-0.2	-0.3	N.A.	N.A.	N.A.
GROWTH	-0.2	-0.9	-1.0	-0.0	1.3	2.0
Consumption						
MSG	0.4	0.4	-0.1	-0.7	-0.7	-0.4
INTERMOD	0.3	0.1	-0.0	N.A.	N.A.	N.A.
GROWTH	0.3	-0.1	-0.7	-0.7	0.2	0.9
Prices						
MSG	-0.1	0.6	0.7	0.1	-0.6	-0.7
INTERMOD	-0.0	0.5	0.6	N.A.	N.A.	N.A.
GROWTH	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Nominal Short-term Interest Rate[a]						
MSG	0.1	1.0	0.9	-0.2	-1.1	-1.2
INTERMOD	0.1	0.2	0.2	N.A.	N.A.	N.A.
GROWTH	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Real Short-term Interest Rate[a]						
MSG	0.1	0.9	0.9	-0.1	-1.1	-1.1
INTERMOD	0.1	0.1	0.2	N.A.	N.A.	N.A.
GROWTH	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Nominal Long-term Interest Rate[a]						
MSG	0.6	1.0	0.4	-0.6	-0.9	-0.9
INTERMOD	0.2	0.2	0.1	N.A.	N.A.	N.A.
GROWTH	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Real Long-term Interest Rate[a]						
MSG	0.5	0.9	0.6	-0.4	-0.9	-0.9
INTERMOD	0.1	0.2	0.1	N.A.	N.A.	N.A.
GROWTH	0.1	0.4	0.3	-0.1	-0.4	-0.6
Real Exchange Rate						
MSG	1.5	1.6	-0.2	-2.5	-2.8	-1.9
INTERMOD	0.8	0.9	0.4	N.A.	N.A.	N.A.
GROWTH	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
National Saving Rate[a]						
MSG	-0.2	-0.6	-0.6	0.0	0.6	0.9
INTERMOD	-0.1	-0.2	-0.2	N.A.	N.A.	N.A.
GROWTH	-0.4	-0.6	-0.2	0.6	0.9	0.8
Capital Stock						
MSG[b]	0	-.3	-.5	-.2	.3	.5
INTERMOD	0.1	-0.1	-0.1	N.A.	N.A.	N.A.
GROWTH	-1.2	-3.8	-3.5	0.8	5.6	8.0

NOTES: n.a. = not applicable; N.A. = not available.

a. The difference from baseline in percentage points.

b. Levels for the baseline capital stock were approximated by the Congressional Budget Office.

An alternative means of illustrating the effects of these changes in Social Security funding on real GNP is shown in Tables 4 and 5. These tables express the effects on GNP in 1991 dollars (adjusted for changes in the price level), in real per-capita terms (further adjusting for the growth in population), and in terms of 1991 "dollar equivalents" (real dollar values that have been discounted so that they are commensurate with today's income levels).[10]

Differences in Results Among the Models

Though the model results presented in Tables 2 and 3 are qualitatively similar--that is, for most of the variables, the models predict changes in the same direction--they differ substantially in their magnitude. These differences occur because of differences in the properties of the models.

In general, the growth model predicts larger macroeconomic effects from changing Social Security than the two more complex models, for three reasons. First, the more complex models predict smaller effects on real GNP because, unlike the growth model, they can simulate the effects of changing Social Security taxes on the exchange rate. Because the exchange rate appreciates on average in this first period, the cost of imported intermediate goods falls and potential output is a little higher than it would have been had the exchange rate not moved. The appreciation

10. These "present value" dollar numbers are calculated by discounting the dollar differences from baseline in these future time periods, at a rate equal to the average growth rate of real GNP between now and the particular time period.

TABLE 4. RESULTS OF SIMULATION ANALYSIS, USING THREE ECONOMIC MODELS, OF ALT1: THE EFFECT ON REAL GNP (Annual averages)

	1992-1996	1997-2006	2007-2016	2017-2026	2027-2036	2037-2046
Difference of Real GNP from Baseline in Billions of 1991 Dollars						
MSG	0	-30	-53	-42	13	76
INTERMOD	13	-15	-27	N.A.	N.A.	N.A.
GROWTH	-25	-81	-89	-11	152	303
Difference of Real Per Capita GNP from Baseline in 1991 Dollars						
MSG	0	-105	-179	-136	40	234
INTERMOD	47	-53	-90	N.A.	N.A.	N.A.
GROWTH	-95	-290	-298	-34	476	936
Difference of Real GNP from Baseline in Billions of 1991 Dollar Equivalents						
MSG	0	-24	-36	-24	6	30
INTERMOD	12	-12	-18	N.A.	N.A.	N.A.
GROWTH	-24	-65	-59	-6	71	118

SOURCE: Congressional Budget Office.

NOTE: N.A. = not available.

TABLE 5. RESULTS OF SIMULATION ANALYSIS, USING THREE ECONOMIC MODELS, OF ALT2: THE EFFECT ON REAL GNP (Annual averages)

	1992-1996	1997-2006	2007-2016	2017-2026	2027-2036	2037-2046
Difference of Real GNP from Baseline in Billions of 1991 Dollars						
MSG	6	-22	-53	-32	25	76
INTERMOD	13	-15	-27	N.A.	N.A.	N.A.
GROWTH	-13	-67	-89	0	165	303
Difference of Real Per Capita GNP from Baseline in 1991 Dollars						
MSG	24	-79	-179	-102	79	234
INTERMOD	47	-53	-90	N.A.	N.A.	N.A.
GROWTH	-47	-237	-298	0	515	936
Difference of Real GNP from Baseline in Billions of 1991 Dollar Equivalents						
MSG	6	-18	-36	-18	12	30
INTERMOD	12	-12	-18	N.A.	N.A.	N.A.
GROWTH	-12	-53	-59	0	77	118

SOURCE: Congressional Budget Office.

NOTE: N.A. = not available.

of the exchange rate also reduces the cost of consumer goods, making possible a substantial and persistent increase in consumption.

Second, unlike the other two models, the growth model does not predict any changes in private saving to offset changes in government saving. Thus, during the period of declining national saving, the growth model predicts that national saving falls by the full amount of the increase in the government's deficit. Because consumers in the two more complex models are forward looking, however, they are assumed to increase their saving to reflect their expectations of having to pay higher taxes in the future. This means that national saving falls by less than the increase in the government's deficit. For these two models, the smaller change in national saving compared with that in the growth model implies smaller changes in investment, in the capital stock, and in real GNP.

The third factor accounting for the smaller macroeconomic effects in the more complex models is international capital flows. Unlike the growth model, which assumes that net exports are constant, the other two models show large changes in net exports that are generated by changes in exchange rates and changes in aggregate demand. During the period of declining national saving, the deterioration in net exports that occurs in the larger models implies a substantial increase in borrowing from other countries. Foreign borrowing partially substitutes for the decline in national saving, so that domestic investment (and hence the capital stock) does not fall as much in the two larger models as in the growth model.

During the period of declining national saving, both of the more complex models show interest rates and exchange rates rising. However, INTERMOD has markedly milder increases in these variables than does MSG. This is because interest rates are much more sensitive in MSG to changes in the real money supply (which declines by about the same extent in both models).[11] The larger increase in MSG's interest rates is directly responsible for that model's prediction of a larger increase in the value of the dollar.

11. Empirical studies of U.S. money demand functions suggest that the relationship between interest rates and real money balances is probably more accurately described in MSG than in Intermod.